Atmos. Chem. Phys. Discuss., 7, S230–S232, 2007
www.atmos-chem-phys-discuss.net/7/S230/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Interannual variability of the stratospheric wave driving during northern winter" *by* A. J. Haklander et al.

Anonymous Referee #3

Received and published: 20 February 2007

General comments

This paper investigates the interannual variability of the stratospheric wave driving, as approximated by the heat flux at 100 hPa, averaged over 40-80 N. In previous studies, this quantity has been shown to be useful for studying the link between wave activity propagating from the troposphere, and stratospheric dynamics and chemistry. Given the importance of this quantity and the many unanswered questions about the causes of the (interannual) variability of this quantity, this study is very relevant. By means of correlation analysis, the authors present a systematic study with interesting results. It is well written, and the results are generally convincing. However, I share the same concerns with anonymous referee #2 regarding the quality of the ERA-40 dataset before the introduction of satellite measurements.

Specific comments

As noted by the authors in the introduction (p. 68, line 9), Hu and Tung (2003) studied H100, and found a significant downward trend of H100 over 1979-2002. They didn't include 1958-78 in their trend analysis since NCEP-NCAR reanalysis data are thought to be less reliable before the satellite era. Unless the authors can argue that stratospheric ERA-40 data are more reliable before 1979, this period should be omitted in the analysis.

p. 71, l.19-24: A more extensive explanation of this interpretation would help.

p. 72, l. 20-end: Note that averaged over 1979-2002, the trend doesn't seem to be statistically significant either. Hu and Tung (2003) did find highly significant trends in H100, but they averaged over JFM instead of JF. The trends therefore seem to be very sensitive to the chosen averaging months, most likely due to the mechanisms driving the trend described in Hu and Tung (2003).

p.74: I agree with the authors that wave activity could originate or end up outside the 40-80N band. However, including the area 0-40N could lead to an unnecessary dilution of the signals. The area 0-40N is a very large area, much larger than the 40-80N area! Correlating with the heat flux averaged over 20-90N instead of the entire NH might be a better approach.

p.76, l. 2: Do you have a suggestion for the physical reason that there is no coupling between H100 and the tropospheric waves 3 and higher?

p. 77, l. 19: The mid-latitude tropospheric refractive index ridge is hard to distinguish in Fig. 5a. You could adapt the contours to make it more clear, or use shading instead of contours. Alternatively, you could draw a line in Fig. 5a which denotes the approximate location of the ridge.

p 78, l.2-3: Is this consistent with the refractive index for s=2?

p. 78, line 14: How would you interpret the fact that the correlation of H100 with the

ACPD

7, S230–S232, 2007

tropospheric heat flux around 30N is negative?

Technical corrections:

p. 68 line. 27: Eyring (2005) –> Eyring et al. (2005)

p. 72, line 3: Siegmund (1994) –> Siegmund(1995)

p. 72: I would suggest to number the section before 3.1 as 3.1, and to adapt the rest of the sections accordingly.

p. 81, line 12: In my opinion, it's a bit odd to refer to the abstract in the summary section

---

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 65, 2007.